



DECUS

PROGRAM LIBRARY

DECUS NO.	8-301
TITLE	STOR: A STORE INSTRUCTION FOR THE PDP-8 DISK MONITOR
AUTHOR	Joseph Green
COMPANY	University of Alberta Edmonton, Alberta, Canada
DATE	November 16, 1969
SOURCE LANGUAGE	PALD

STOR: A STORE INSTRUCTION FOR THE PDP-8 DISK MONITOR

DECUS Program Library write-up

DECUS No. 8-301

ABSTRACT

The PDP-8 has a monitor which can operate with the system device being either disk (unit 0) or magnetic tape (unit 3). For those systems having both disk and tape, the disk as a system device gives fast response but is awkward to load and is open to destruction by other users of the system. The tape on the other hand, gives very poor response time but has the advantage of being private. (The user removes his tape with his monitor, programs, and files at the end of the working session.)

This program provides a method for storing the disk monitor system on magnetic tape (unit 8) at the end of the working session, and for restarting the disk monitor at the beginning of a new session on the PDP-8.

LOADING

The program is loaded using the disk monitor binary loader in two passes.

```
.LOAD
*IN-T:
*
*OPT-2
ST=
↑ ↑ ↑ ↑
.SAVE STOR! 6600-7377;6600
```

OPERATION

When the user wishes to save the disk monitor system, programs and files on the magnetic tape file on unit 8, he should simply execute the system program STOR.

.STOR

This causes the entire disk (unit 0) to be written out on the tape along with a loader program which is used to restart the monitor at some future time. The time taken to write the disk onto tape is about three minutes. After the writing is complete the control is returned to the disk monitor. The working session can now be terminated by stopping the computer and removing the Save tape from unit 8.

To start a working session simply toggle in the regular DECTape monitor bootstrap at location 200 (given in the monitor handbook) and execute after the Save tape from the previous session has been placed on tape drive 8. This causes the A stored program on tape to restore the disk monitor system and to transfer control to the disk monitor once it has been restored on the disk (0).

In this way a user has the advantage of working with the disk monitor system (fast response) and also the security of a private Save tape.

Lengthy reloading procedures to restore the disk monitor after a software crash are eliminated, and the monitor programs etc. remain private (on tape file). Monitor restarts at 7600 are unchanged. When loading the previously saved monitor files etc. from tape unit 8 via the bootstrap at address 200, it is not necessary to have the Write Enabled on. The system will load and start itself via the bootstrap at 200 with the write lock on. This provides further protection of the Save file (magtape with the previously stored disk monitor system, programs and files).

The program also places the DECTape bootstrap at location 200 before returning to the disk monitor system after the Save file has been created on unit 8.

MONITOR BOOTSTRAP

7600
1216
4210
1217
3620
1222
4210
5600
0000
6766
3621
6771
5213
5610
0000
7577
7755
7754
0220

Notice that this is identical to the bootstrap given on page 2-2 in the manual for the disk monitor system.

EXECUTION TIME

The program requires about 3 minutes to save the monitor on tape (unit 8) and about 3 minutes to restore the disk monitor via the bootstrap at 200.

WARNING

Do not try to access files from unit 8 or to write files on unit 8 while under monitor as this could destroy the saved copy of monitor on that tape unit. If tape files are to be used then first remove the Save tape after the monitor has been brought up via the bootstrap. Place the tape containing files of interest on the drive and use in the ordinary fashion. Similarly storing the disk monitor by executing .STOR will destroy all previously held files on that tape.

AGAIN	7046
A200	7311
A7177	6746
BL	6676
PLK	7113
BLKNO	7115
BLNO	7240
BOOT	6733
BT	7357
C	6654
CA	7351
CHOP	7140
COUNT	6751
COUNTP	7237
CURADD	7110
C1	7120
C2	7121
C3	7122
C4	6757
DOWHER	7364
DOWN	7065
DOWNP	7272
D1	7306
D2	7307
D3	7312
EAA	7373
EXAD	6655
GCOUNT	7375
GO	7102
HERE	7256
JOE	7144
LC	6753
LOOP	6620
LOOPP	7202
LOPY	7132
LUP	7325
MINE	7143
MM1	7376
MM7	7374
MONITR	6742
M200	6747
M400	6750
M400P	7236
M5	6754
M7	6752
M7000	7111
M7576	6743
PBLKNO	7114
PBOOT	6732
PBT	7356
PCA	7022
PCA1	6745
PDECT	7123
PGO	6760
PREAD	6756
PROP	7141

PSA	7241
PSTART	7244
PTBN	7352
PTCA	7116
PTWC	7117
PWC	7021
PWC1	6744
PWRITE	6755
PS	7242
P7177	7310
P7576	7243
R	7320
READ	7000
RESTOR	6740
RND	7142
RUN	7313
S	7245
SA	6741
SHIFT	6627
SR	7276
TBK	7305
TBN	7353
TC	6674
TCA	7355
TRA	7372
TRAD	6656
TW	6673
TWC	7354
UN	6675
UNIT	7112
UP	7047
W	6653
WC	7350
WCOUNT	7107
WRITE	7023
W1	6611

/SAVE STOR! 6600-7377:6600

6600	7300	*6600
6601	1357	CLA CLL
6602	6762	TAD C4
6603	4760	6762
6604	1346	JMS I PGO
6605	3212	TAD A7177
6606	1347	DCA W1+1
6607	3211	TAD M200
6610	4755	DCA W1
6611	0000	JMS I PWRITE
6612	0000	W1, 0
6613	0000	0
6614	0000	0
6615	7300	CLA CLL
6616	1350	TAD M400
6617	3351	DCA COUNT
6620	1350	LOOP, TAD M400
6621	7041	CIA
6622	1351	TAD COUNT
6623	3256	DCA TRAD

6624	3255		DCA EXAD
6625	1352		TAD M7
6626	3353		DCA LC
6627	7300	SHIFT,	CLA CLL
6630	1256		TAD TRAD
6631	7004		RAL
6632	3256		DCA TRAD
6633			
6634	7004		RAL
6635	3255		DCA EXAD
6636	2353		ISZ LC
6637	5227		JMP SHIFT
6640	7300		CLA CLL
6641	1255		TAD EXAD
6642	7006		RTL
6643	7006		RTL
6644	7006		RTL
6645	3255		DCA EXAD
6646	1347		TAD M200
6647	3253		DCA W
6650	1346		TAD A7177
6651	3254		DCA C
6652	4756		JMS 1 PREAD
6653	0000	W,	0
6654	0000	C,	0
6655	0000	EXAD,	0
6656	0000	TRAD,	0
6657	7300		CLA CLL
6660	1350		TAD M400
6661	7041		CIA
6662	1351		TAD COUNT
6663	7001		IAC
6664	3276		DCA BL
6665	1347		TAD M200
6666	3273		DCA TW
6667	1346		TAD A7177
6670	3274		DCA TC
6671	3275		DCA UN
6672	4755		JMS 1 PWRITE
6673	0000	TW,	0
6674	0000	TC,	0
6675	0000	UN,	0
6676	0000	BL,	0
6677	7300		CLA CLL
6700	2351		ISZ COUNT
6701	5220		JMP LOOP
6702	6762		6762
6703	1357		TAD C4 /REWIND
6704	4760		JMS 1 PGO
6705	6601		6601
6706	6611		6611 /CLEAR CONTROLS AND INITIALIZE
6707	1332		TAD PBOOT
6710	3010		DCA Z 10
6711	1341		TAD SA
6712	3011		DCA Z 11

6713	1354		TAD M5
6714	3351		DCA COUNT
6715	1410		TAD 1 Z 10
6716	3411		DCA 1 Z 11
6717	2351		1SZ COUNT
6720	5315		JMP --3
6721	1343		TAD M7576
6722	3744		DCA 1 PWC1
6723	1343		TAD M7576
6724	3745		DCA 1 PCA1
6725	6601		6601
6726	6611		6611
6727	6766		6766
6730	4740		JMS 1 RESTOR
6731	5742		JMP 1 MONITR
6732	6732	PEOOT,	BOOT-1
6733	6603	BOOT,	6603
6734	6622		6622
6735			
6736	5704		5704
6737	7600		7600
6740	7123	RESTOR,	PDECT
6741	0277	SA,	277
6742	0300	MONITR,	300
6743	7576	M7576,	7576
6744	7750	PWC1,	7750
6745	7751	PCA1,	7751
6746	7177	A7177,	7177
6747	7600	M200,	-200
6750	7400	M400,	-400
6751	0000	COUNT,	0
6752	7771	M7,	-7
6753	0000	LC,	0
6754	7773	M5,	-5
6755	7023	PWRITE,	WRITE
6756	7000	PREAD,	READ
6757	0600	C4,	0600
6760	7102	PGO,	GO
			/CALLING SEQUENCE
			/JMS READ ENTRY CLA
			/0 WC DISC
			/0 CA CORE ADD. -1
			/0 EX TRACK ADD.
			/0 TR ADD.
			/XXX RETURN
			*7000
7000	0000	READ,	0
7001	1600		TAD 1 READ
7002	3621		DCA 1 PWC
7003	2200		1SZ READ
7004	1600		TAD 1 READ
7005	3622		DCA 1 PCA
7006	2200		1SZ READ
7007	1600		TAD 1 READ
7010	6615		6615 /DEAL
7011	7200		CLA
7012	2200		1SZ READ

7013	1600		TAD I READ	
7014	6603		6603	/DMAR
7015	6622		6622	
7016	5215		JMP --1	
7017	2200		1SZ READ	
7020	5600		JMP I READ	
7021	7750	PWC,	7750	
7022	7751	PCA,	7751	
			/CALLING SEQUENCE	
			/JMS WRITE ENTRY CLA	
		/0	WC MINUS NO.	
		/0	CA CORE ADD. -1	
		/0	UNIT NO	
		/0	BLOCK NO	
		/XXX	RETURN	
7023	0000	WRITE,	0	
7024	1623		TAD I WRITE	
7025	3307		DCA WCOUNT	
7026	2223		1SZ WRITE	
7027	1623		TAD I WRITE	
7030	3310		DCA CURADD	
7031	2223		1SZ WRITE	
7032	1623		TAD I WRITE	
7033	0311		AND M7000	/ONLY UNIT NO
7034	3312		DCA UNIT	
7035	2223		1SZ WRITE	
7036	1623		TAD I WRITE	
7037	3313		DCA BLK	
7040	1314		TAD PBLKNO	
7041	3716		DCA I PTCA	
7042	3717		DCA I PTWC	
7043	1312		TAD UNIT	
7044	1320		TAD C1	
7045	6762		6762	
7046	4302	AGAIN,	JMS GO	
7047	1315	UP,	TAD BLKNO	
7050	7041		CIA	
7051	1313		TAD BLK	
7052	7500		SMA	
7053	5265		JMP DOWN	
7054	7041		CIA	
7055	7001		IAC	
7056	7041		CIA	
7057	3717		DCA I PTWC	
7060	1321		TAD C2	
7061	4302		JMS GO	
7062	1321		TAD C2	
7063	4302		JMS GO	
7064	5247		JMP UP	
7065	7640	DOWN,	SZA CLA	
7066	5246		JMP AGAIN	
7067	1307		TAD WCOUNT	
7070	3717		DCA I PTWC	
7071	1310		TAD CURADD	
7072	3716		DCA I PTCA	
7073	1322		TAD C3	
7074	4302		JMS GO	

7075	2223		ISZ WRITE
7076	6761		6761 /READ FOR ERRORS
7077	7710		SPA CLA
7100	5240		JMP AGAIN-6
7101	5623		JMP 1 WRITE
7102	0000	GO,	0
7103	6764		6764
7104	6771		6771
7105	5304		JMP .-1
7106	5702		JMP 1 GO
7107	0000	WCOUNT,	0
7110	0000	CURADD,	0
7111	7000	M7000,	7000
7112	0000	UNIT,	0
7113	0000	ELK,	0
7114	7115	PBLKNO,	BLKNO
7115	0000	BLKNO,	0
7116	7755	PTCA,	7755
7117	7754	PTWC,	7754
7120	0210	C1,	0210
7121	0500	C2,	0500
7122	0050	C3,	0050
7123	0000	PDECT,	0
7124	1340		TAD CHOP
7125	3010		DCA Z 10
7126	1341		TAD PROP
7127	3011		DCA Z 11
7130	1342		TAD RND
7131	3343		DCA MINE
7132	1411	LOPY,	TAD 1 Z 11
7133	3410		DCA 1 Z 10
7134	2343		ISZ MINE
7135	5332		JMP LOPY
7136	7300		CLA CLL
7137	5723		JMP 1 PDECT
7140	0177	CHOP,	177
7141			
7142	7755	RND,	-23
7143	0000	MINE,	0
7144	7600	JOE,	7600
7145	1216		1216
7146	4210		4210
7147	1217		1217
7150	3620		3620
7151	1222		1222
7152	4210		4210
7153	5600		5600
7154	0000		0000
7155	6766		6766
7156	3621		3621
7157	6771		6771
7160	5213		5213
7161	5610		5610
7162	0600		0600
7163	7577		7577
7164	7755		7755
7165	7754		7754
7166	0220		0220

7200	1236		*7200 /BOOTSTRAP EXECUTES FROM 7600
7201	3237		TAD M400P
7202	1236	LOOPP,	DCA COUNTP
7203	7041		TAD M400P
7204	1237		CIA
7205	3240		TAD COUNTP
7206	1240		DCA BLNO
7207	4245		TAD BLNO
7210	1240		JMS S /READ TAPE
7211	4320		TAD BLNO
7212	2237		JMS R /DISC RESTORE
7213	5202		ISZ COUNTP
7214	1356		JMP LOOPP
7215	3010		TAD PBT
7216	1241		DCA Z 10
7217	3011		TAD PSA
7220	1242		DCA Z 11
7221	3237		TAD P5
7222	1410		DCA COUNTP
7223	3411		TAD 1 Z 10
7224	2237		DCA 1 Z 11
7225	5222		ISZ COUNTP
7226	1243		JMP --3
7227	3350		TAD P7576
7230	1243		DCA WC
7231	3351		TAD P7576
7232	6601		DCA CA
7233	6611		6601
7234	6766		6611
7235	5644		6766 /CLEAR ALL REG IN DISC-TAPE
7236	7400	M400P,	JMP 1 PSTART
7237	0000	COUNTP,	-400
7240	0000	BLNO,	0
7241	0177	PSA,	0
7242	7773	P5,	177
7243	7576	P7576,	-5
7244	0200	PSTART,	7576
7245	0000	S,	200
7246	7001		0
7247	3305		IAC
7250	1352		DCA TBK
7251	3355		TAD PTEN
7252	3354		DCA TCA
7253	1306		DCA TWC
7254	6762		TAD D1
7255	4313		6762
7256	1353	HERE,	JMS RUN
7257	7041		TAD TEN
7260	1305		CIA
7261	7500		TAD TBK
7262	5272		SMA
7263	1376		JMP DOWNP
7264	3354		TAD MM1
7265	1307		DCA TWC
7266	4313		TAD D2
7267	1307		JMS RUN
7270	4313		TAD D2
7271	5256		JMS RUN
			JMP HERE

7272	7650	DOWNP,	SNA CLA
7273	5276		JMP SR
7274	4313		JMS RUN
7275	5256		JMP HERE
7276	1310	SR,	TAD P7177
7277	3355		DCA TCA
7300	1311		TAD A200
7301	3354		DCA TWC
7302	1312		TAD D3
7303	4313		JMS RUN
7304	5645		JMP 1 S
7305	0000	TBK,	0
7306	0210	D1,	0210
7307	0500	D2,	0500
7310	7177	P7177,	7177
7311	7600	A200,	-200
7312	0030	D3,	0030
7313	0000	RUN,	0
7314	6764		6764
7315	6771		6771
7316	5315		JMP .-1
7317	5713		JMP 1 RUN
7320	0000	R,	0
7321	3372		DCA TRA
7322	3373		DCA EAA
7323	1374		TAD MM7
7324	3375		DCA GCOUNT
7325	7100	LUP,	CLL
7326	1372		TAD TRA
7327	7004		RAL
7330	3372		DCA TRA
7331	1373		TAD EAA
7332	7004		RAL
7333	3373		DCA EAA
7334	2375		ISZ GCOUNT
7335	5325		JMP LUP
7336	1373		TAD EAA
7337	7006		RTL
7340	7006		RTL
7341	7006		RTL
7342	6615		6615
7343	7300		CLA CLL
7344	1310		TAD P7177
7345	3351		DCA CA
7346	1311		TAD A200
7347	5364		JMP DOWHER
			*7350
7350	0000	WC,	0
7351	0000	CA,	0
7352	7753	PTBN,	7753
7353	0000	TBN,	0
7354	7755	TBN,	7755

7355	1155	ICH,	1155
7356	7756	PBT,	7756
7357	6603	BT,	6603
7360	6622		6622
7361	5201		5201
7362	5604		5604
7363	7600		7600
7364	3350	DOWHER,	DCA WC
7365	1372		TAD TRA
7366	6605		6605
7367	6622		6622
7370	5367		JMP .-1
7371	5720		JMP 1 R
7372	0000	TRA,	0
7373	0000	EAA,	0
7374	7771	MM7,	-7
7375	0000	GCOUNT,	0
7376	7777	MM1,	-1

